METHOD AND SYSTEM FOR RECORDING SYSTEM INFORMATION

TECHNICAL FIELD

[0001] This invention relates to configuring and storing data and more particularly to a method and system for recording system information.

BACKGROUND OF THE INVENTION

[0002] Complex machines, such as commercial and military aircraft, at times need to have various systems tested to ensure the machine is operating properly. For example, it is often necessary to test these machines under operating conditions and record data from these tests. When testing various systems of a complex machine, it is convenient to record data from certain inputs or outputs in order to obtain a record of system parameters. It is often of interest to start and stop the recording of certain inputs and outputs based on the condition of a system. For example, when testing systems on an aircraft, certain parameters indicative of the aircraft performance or the performance of a system might be of interest to record when the aircraft is operating between certain altitudes or at certain airspeed. However, current methods of recording such data have been limited.

[0003] Traditionally, to record information such as that generated by an aircraft and its various systems, bulky data recorders are attached to a serial output of a processor unit associated with the system and data is recorded. The use of this type of data recorder has several drawbacks. First, the data recorders are large and expensive. Also, the data recorders typically record all the signals from a given input or output, or all data from all inputs and output. There is no way to tell the system what data should be recorded and when recording should take place. This leads to the storage of unnecessary information and wasting of space on the recording medium. The bulky recorders are also not very portable and are not a convenient way to carry the data.

[0004] Therefore, a need has arisen for a recording method that both utilizes a recording medium that is compact and convenient to use a carry, but that also provides a way to easily specify what data is to be recorded and under what condition the recording should take place. The specification of what data to record and when to record the data should be done in such a way as to be easily changed by the user to record other data of interest. Therefore, what is needed is a method and system for recording system information.

SUMMARY OF THE INVENTION

[0005] Therefore a need has arisen for a method and system for recording system information.

[0006] In one embodiment, a memory card for storing test data is disclosed. The memory card includes a supplemental file section that stores a supplemental file. The supplemental file includes instructions indicating the data to be recorded and/or when to record the data. The memory card also includes a file storage area for storing data based on the instructions in the supplemental file. The supplemental file of the memory card may include a plurality of hexadecimal characters. In this embodiment, the system reads the position and bit value of the hexadecimal character and determines the data to be recorded. Additionally, the supplemental file of the memory also contains instructions for starting and stopping recording data when certain predefined conditions are met.

[0007] In another embodiment, an apparatus for recording information about a system is disclosed. Included is a memory card. The memory card includes a supplemental file and a file storage section. Also included is a processor unit designed to read from and write to the memory card. The supplemental file includes instructions for the processor that tells the processor what information to save to the file storage section.

[0008] In another embodiment, a method for recording data concerning a system is disclosed. The method includes a step of storing a supplemental file on a memory device. The supplemental file contains instructions indicating the data to record. Next, the memory device is coupled to a processor unit. The processor unit reads the supplemental file and stores the data to the memory device.

[0009] Technical benefits of the present invention include that only specified data is stored. This includes the ability to specify parameters to start and stop the recording of data. Other technical benefits are apparent from the following descriptions, illustrations and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[00010] Non-limiting and non-exhaustive preferred embodiments of the present invention are described with references to the following figures wherein like reference numerals refer to like parts throughout the various views unless otherwise specified.

[00011] FIG. 1 illustrates a data recording system for monitoring and recording data concerning another system or subsystem;

[00012] FIG. 2 is a block diagram of an avionic implementation of the present invention;

[00013] FIG. 3 illustrates an exemplary memory card;

[00014] FIG. 4 illustrates the format of the supplemental file;

[00015] FIG. 5 is a flow chart indicating the use of the present invention; and

[00016] FIG. 6 is a flow chart indicating the use of the present invention to selectively record data.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[00017] A flash configurable memory, according to various aspects of the present invention, stores a supplemental file. The supplemental file specifies which parameters of a system are to be recorded and under what conditions to record the data to a solid-state memory card. Parameters include, among other things, specific bus inputs/outputs on a communication bus. The present invention also provides a way to specify under what conditions to record data. Conditions may include aircraft altitude, aircraft status and the like.

[00018] A system for recording information regarding a system, according to various aspects of the present invention, generally includes a processor unit for monitoring inputs and outputs. Additionally, a memory card reader and writer receives data from the processor unit and records the data. The memory card may include a supplemental file that specifies which inputs and outputs to record from and when to record the data from the inputs and outputs.

[00019] For example, FIG. 1 illustrates a processing system 100 where data concerning this system or another system or subsystem may be monitored and recorded. System 100 includes a central processor unit 102. Central processor unit 102 sends data to and receives data from one or more subsystem processor units 106 via input/output lines 104. Processor unit 102 also processes data it receives. A memory card 108 is coupled to processing unit 102 via a reader/writer (not pictured) that can be directly incorporated as part of processor unit 102 or attached to processor unit 102 via a line such as a serial communication line.

[00020] Processing system 100 can be any system for monitoring another system and the environment of that system. For example, system 100 may be used in a factory. In this example, central processing unit 102 may receive information regarding plant parameters from individual subsystem processor units 106. In another embodiment processing system 100 may be installed in an aircraft as part of an aircraft traffic and terrain collision avoidance system. The embodiment

where system 100 is an aircraft traffic and terrain collision avoidance system will be discussed in greater detail in conjunction with FIG. 2.

[00021] Central processor unit 102 receives and processes information received from subsystem processor units 106. Central processor unit 102 can also send information to subsystem processing units 106.

[00022] Subsystem processor unit 106 may be any device capable of receiving or detecting information such as a temperature sensor, an altimeter and the like. Subsystem process unit 106 may also process data detected or received to produce additional data that can then be sent to the central processor unit 102.

[00023] Input/output connection 104 is any connection between central processor unit 102 and subsystem processor units 106 that is capable of transmitting data, either wired or wireless.

[00024] Memory card 108 is any solid state memory device capable of storing information including a COMPACTFLASH card first developed by the SanDisk Corporation of Santa Clara California, a SMART MEDIA card manufactured by Toshiba Corporation, a Memory Stick manufactured by Sony Corporation, a Multi Media card developed jointly by SanDisk and Siemens, a PCMCIA compatible memory card, or any other solid state device capable of storing information. Solid-state memory cards are advantageous for storing data because they are easily transportable, shock resistant and can go through numerous read/write cycles. Additionally, solid-state memory cards typically do not require batteries to retain their memory when stored. Memory card 108 may also be a portable magnetic storage device such as a portable hard drive like the MicroDrive by International Business Machines of Armark, New York. Memory card 108 is either inserted into a reader/writer in central processor unit 102 or attached to a read/write device coupled to central processor unit 102. Once inserted, memory card 108 records data detected by or generated within processing system 100. Memory card 108 may also include a file that specifies which input/output to record and/or under what conditions to record the inputs. In one embodiment, memory card 108 is a 256 MB compact flash card, although other size memory cards using other formats can also be substituted without departing from the scope of the present invention.

[00025] In operation, central processor unit 102 receives data from one or more subsystem processor units 106. Central processor unit 102 may also generate data based on received information. All or part of this information can be saved to memory card 108. The data stored on memory card 108 can then be used to analyze the system being monitored.

[00026] FIG. 2 is a block diagram of an avionic embodiment of the present invention. Illustrated are major components of an air traffic and terrain collision avoidance system 200

(referred to as T2CAS as manufactured by ACSS of Phoenix, Arizona). System 200 can be used for navigation, flight management, mission command, communication and control, and/or air traffic collision avoidance. In the discussions below, the present invention can be used in any collision avoidance system with or without terrain avoidance capabilities. System 200 comprises a terrain and traffic collision avoidance processor 208, transponder unit 202, GPS unit 204, radio altimeter 216 and memory card reader 213.

[00027] System 200 includes a terrain and traffic collision avoidance processor unit 208. Terrain and traffic collision avoidance processor unit 208 receives data from various subsystems described below and determines the portion of the aircraft it is monitoring in relation to other aircrafts and terrain. The terrain and traffic avoidance processor unit 208 can also output data to other output devices, such as a display. Terrain and traffic avoidance processor unit 208 may include a memory 209. Memory 209 stores information regarding the configuration of the aircraft such as what are the inputs and outputs to the terrain and traffic avoidance processor unit 208. This information is stored as and aircraft specific database (ASDB) 211. Components of system 200 are typically connected to terrain and traffic avoidance processor unit 208 via wires such as a twisted pair of wires that transmits digital data. In one embodiment the digital data is transmitted as specified in ARINC-429 hereby incorporated in its entirety by reference. Other components transmit analog data, which can be recorded in a digital format. For example, radio altimeter 215 may be an analog device that outputs a voltage that corresponds to the altitude. There are also discrete analog inputs 217 that output one of two values such as circuit open or closed. An example of a discrete input is the landing gear position, which is either in the up or down position.

[00028] In one embodiment, transponder unit 202 is a mode-S transponder such as the XS-950 mode transponders manufactured by ACSS of Phoenix, Arizona. Transponder 202 includes an omni-directional antenna 215 for transmitting/receiving information to/from other aircraft or air traffic control ground stations. Transponder unit 202 receives inputs from the central panel 212 of the aircraft as well as from a pressure altimeter 214. Transponder unit 202 may be any device or combination of devices capable to receive communications known as interrogations from another aircraft or air traffic control ground station and respond to these interrogations. The replies to these interrogations may include the position of the aircraft and its identification.

[00029] Global positioning system (GPS) receiver 204 is also coupled to processor unit 208. GPS receiver 204 may be any device or devices that can provide navigational data to processor unit 208 through the reception of locational signals. GPS receiver 204 receives locational signals, via GPS antenna 216.

[00030] Radio altimeter 215 is also coupled to processor unit 208. Radio altimeter 215 is used to determine the altitude of the aircraft using radio waves reflected from the ground.

[00031] Memory card 108 is coupled to terrain and traffic collision avoidance processor unit 208 via a memory card reader/writer 213 in such a way as to be able to receive and record data sent to, sent from and/or processed by the terrain and traffic collision avoidance processor unit 208. Memory card 108 can also record parameters internal to the T^2CAS such as the status of internal counter such as those that track how long software has been running. In one embodiment, processor unit 208 has a slot containing a reader/writer unit 213 that accepts memory card 108 for read/write operation. In another embodiment a reader/writer unit 213 is located remotely from the processor unit 208 but is in communication with the processor unit 208. Memory card 108 may record data inputs to the processor unit 208, data outputs of the processor unit 208, and data created within the processor unit 208. Memory card 108 may record digital or analog data onto the memory card 108 in a digital form.

[00032] Vertical speed display 228 is coupled to and receives data from processor unit 208. Vertical speed display 228 indicates the speed of the aircraft as vertical speed in feet per minute. Vertical speed display 228 can also be used as a vertical speed indicator/traffic advisory and resolution advisory screen, which provides both vertical speed and indication of the aircraft position in reference to other aircraft. The output to vertical speed display 228 is typically a wired output such as those specified by ARINC-429.

[00033] Radar display 280 is coupled to the processor unit 208 and is capable of displaying other aircraft location. Radar display 280 can also display terrain data in an aircraft capable of displaying this information. Radar display 280 can also couple to weather radar unit 206 to receive and display weather data. Audio annunciator 230 receives outputs from the processor unit 208 in order to provide audio advisories to the pilot of the aircraft. Other outputs 232 to the processor units also exist to support various subsystems.

[00034] In operation, memory card 108 is used in testing to record in-flight data. Memory card 108 is communicatively coupled to the processor unit 208 such as by insertion into a slot of memory card reader/writer 213 in the processor unit 208, which connects the memory card 108 for reading and writing operations. Other methods of coupling memory card 108 to processing unit 208 can be used. Memory card 108 can receive data from any input of processor unit 208, any output of processor unit 208, as well as data generated internal to processor unit 208. Memory card 108 may contain a supplemental file that is read before data storage to indicate what data is recorded to the memory card.

[00035] FIG. 3 is a block diagram of the structure of an exemplary memory card 108. Memory card 108 includes a header section 302, a supplemental file storage area 304 that stores a supplemental file 305 and a data storage area 306. The header section 302 may contain a configuration file 303. If processor unit 208 detects the presence of the configuration file 303, data recording is enabled. The configuration file 303 indicates whether there is a supplemental file 305. If the configuration file 303 indicates there is not a supplemental file 305, all data parameters defined by an aircraft specific database (ASDB) 211 are continuously recorded to memory card 108. The ASDB 211 is a database specific to each aircraft that specifies, among other things, the configuration of various aircraft parameters including the assignment of each input and output of the processor unit 208. The ASDB 211is stored in memory 209 at the processor unit 208. If the configuration file 303 indicates the presence of a supplemental file 305, processor unit 208 reads supplemental file 305, which is stored in supplemental file storage area 304. The supplemental file 305 contains instructions that are read and interpreted by processor unit 208. These instructions indicate what parameters are to be recorded to memory card 108 and stored in the data storage area 306. If there is no supplemental file, then all data generated by, sent to or sent from processor unit 208 is recorded. Alternatively, if there is no supplemental file, a default set of data is recorded. The default set of data can be chosen ahead of time and could be based on the typical data needed by maintenance workers, the typically data needed by a supplier to evaluate the suppliers component or any other predetermined set of data. The ASDB 211 can store which parameters of the system comprise the default data.

[00036] In an alternative embodiment, the supplemental file maybe sent over a parallel or serial connection directly to processor unit 208 without it being read from a memory card. For example, the supplemental file may be sent over an Ethernet or RS-232 connection to processor unit 208. The processor unit reads the supplemental file and outputs the data to be recorded based on the supplemental file. The data can be sent back over the same Ethernet or RS-232 to a computer (such as a laptop) for recording on a hard drive, optical drive, or solid-state memory card coupled to the computer. Alternatively, the data can be sent to card reader 213 for recording on a memory card 108.

[00037] In one embodiment, supplemental file 305 comprises a series of hexadecimal characters with each character representing a hexadecimal value between zero and F. A hexadecimal value between zero and F represents a decimal value between zero and 15. Referring to FIG. 4, the hexadecimal characters are placed in order from a first position 402 all the way to the last position 403. Each hexadecimal character can also be expressed as a binary value having at

most four bits. The binary value has at most four bits because the greatest four bit binary number, 1111, is equal to 15 in decimal or F in hexadecimal, which is the largest hexadecimal value. For example, the hexadecimal value "A" is equivalent to the decimal value 10 and the binary value 1010. The binary value 1010 has a one in the first position which is also known as the most significant bit, a zero in the second position, a one in the third position, and a zero in the fourth position where the fourth position is known as the least significant bit. In the present invention, the position of the hexadecimal character in a series of hexadecimal characters and the value of each of the bit numbers for the equivalent binary numbers for that hexadecimal character, tells the processing unit 102 what data to record. The hexadecimal character and the binary equivalent are used in conjunction with a decoder table 219, which, in one embodiment, is stored at the processor unit 208 in conjunction with the aircraft specific database 211 to set what data is recorded and from where the data is recorded. An exemplary decoder table 219, which correlates the assignment of hexadecimal characters and the associated bit numbers to the actual inputs and outputs to record and when to record, is shown in Table 1, below. In the table "RX" means to enable recording. Enabling recording enables the recording of all the data that is received by the input or the output while filtering records only parameters defined by the ASDB, which among other things, assigns each ARINC 429 input to specific devices.

Table 1 Flight Recording Supplemental File Character Definition

Character	Bit Number	Name	Definition
1	1	Spare	
1	2	Spare	
1	3	Spare	
1	4	Spare	
2	1	FILTER RX 1	Enables recording of ARINC 429 Input #1 data
2	2	FILTER ASDB RX 1	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #1 data
2	3	FILTER RX 2	Enables recording of ARINC 429 Input #2 data
2	4	FILTER ASDB RX 2	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #2 data
3	1	FILTER RX 3	Enables recording of ARINC 429 Input #3 data
3	2	FILTER ASDB RX 3	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #3 data
3	3	FILTER RX 4	Enables recording of ARINC 429 Input #4 data
3	4	FILTER	Enables filtering in accordance with ASDB

		ASDB RX 4	parameters of ARINC 429 Input #4 data
4	1	FILTER RX 5	Enables recording of ARINC 429 Input #5 data
4	2	FILTER ASDB RX 5	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #5 data
4	3	FILTER RX 6	Enables recording of ARINC 429 Input #6 data
4	4	FILTER ASDB RX 6	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #6 data
5	1	FILTER RX 7	Enables recording of ARINC 429 Input #7 data
5	2	FILTER ASDB RX 7	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #7 data
5	3	FILTER RX 8	Enables recording of ARINC 429 Input #8 data
5	4	FILTER ASDB RX 8	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #8 data
6	1	FILTER RX 9	Enables recording of ARINC 429 Input #9 data
6	2	FILTER ASDB RX 9	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #9 data
6	3	FILTER RX 10	Enables recording of ARINC 429 Input #10 data
6	4	FILTER ASDB RX 10	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #10 data
7	1	FILTER RX 11	Enables recording of ARINC 429 Input #11 data
7	2	FILTER ASDB RX 11	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #11 data
7	3	FILTER RX 12	Enables recording of ARINC 429 Input #12 data
7	4	FILTER ASDB RX 12	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #12 data
8	1	FILTER RX 13	Enables recording of ARINC 429 Input #13 data
8	2	FILTER ASDB RX 13	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #13 data
8	3	FILTER RX 14	Enables recording of ARINC 429 Input #14 data
8	4	FILTER ASDB RX 14	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #14 data
9	1	FILTER RX 15	Enables recording of ARINC 429 Input #15 data
9	2	FILTER ASDB RX 15	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #15 data
9	3	FILTER RX 16	Enables recording of ARINC 429 Input #16 data
9	4	FILTER	Enables filtering in accordance with ASDB

		ASDB RX 16	parameters of ARINC 429 Input #16 data
10	1	FILTER RX 17	Enables recording of ARINC 429 Input #17 data
10	2	FILTER ASDB RX 17	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #17 data
10	3	FILTER RX 18	Enables recording of ARINC 429 Input #18 data
10	4	FILTER ASDB RX 18	Enables filtering in accordance with ASDB parameters of ARINC 429 Input #18 data
11	1	FILTER AI	Enables recording of all Analog Input Data
11	2	FILTER GCAM	Enables recording of GCAM data
11	3	FILTER T^2CAS	Enables recording of T^2CAS data
11	4	Spare	
12	1	FILTER TX 1	Enables recording of ARINC 429 Output #1 data
12	2	FILTER TX 2	Enables recording of ARINC 429 Output #2 data
12	3	FILTER TX 3	Enables recording of ARINC 429 Output #3 data
12	4	FILTER TX 4	Enables recording of ARINC 429 Output #4 data
13	1	FILTER DI	Enables recording of all Discrete Input Data
13	2	FILTER DO	Enables recording of all Discrete Output Data
13	3-4	Spare	
14 - 16	1-4	Spare	
17 - 24	1-4	CONDITION 1 ADDRESS	Provides a 32-bit Data Parameter Address to Evaluate Condition 1
25	1-4	CONDITION 1 TYPE	Type condition for contents of address: '1' indicates a 32-bit integer. '2' indicates a 32-bit floating point. '3' indicates a 64-bit integer. '4' indicates a 64-bit floating point.
26	1-4	LOGICAL TEST 1	Test to be applied to contents of CONDITION 1 ADDRESS. '1' indicates an evaluation of the contents of CONDITION 1 ADDRESS > CONDITION 1 VALUE. '2' indicates an evaluation of the contents of CONDITION 1 ADDRESS ≥ CONDITION 1 VALUE. '3' indicates an evaluation of the contents of CONDITION 1 ADDRESS = CONDITION 1 VALUE. '4' indicates an evaluation of the contents of

			CONDITION 1 ADDRESS ≠ CONDITION 1 VALUE. '5' indicates an evaluation of the contents of CONDITION 1 ADDRESS ≤ CONDITION 1 VALUE. '6' indicates an evaluation of the contents of CONDITION 1 ADDRESS < CONDITION 1 VALUE.
27-28	1-4	Spare	
29 - 36	1-4	CONDITION 1 VALUE #1	The value to evaluate condition 1, for 64 bit type.
37 - 44	1-4	CONDITION 1 VALUE #2	The value to evaluate condition 1 for 32 bit type, or the continuation of a 64 bit type value.
45 - 52	1-4	CONDITION 2 ADDRESS	Provides a 32-bit Data Parameter Address to Evaluate Condition 2
53	1-4	CONDITION 2 TYPE	Type condition for contents of address: '1' indicates a 32-bit integer. '2' indicates a 32-bit floating point. '3' indicates a 64-bit integer. '4' indicates a 64-bit floating point.
54	1-4	LOGICAL TEST 2	Test to be applied to contents of CONDITION 2 ADDRESS. '1' indicates an evaluation of the contents of CONDITION 2 ADDRESS > CONDITION 2 VALUE. '2' indicates an evaluation of the contents of CONDITION 2 ADDRESS ≥ CONDITION 2 VALUE. '3' indicates an evaluation of the contents of CONDITION 2 ADDRESS = CONDITION 2 VALUE. '4' indicates an evaluation of the contents of CONDITION 2 ADDRESS ≠ CONDITION 2 VALUE. '5' indicates an evaluation of the contents of CONDITION 2 ADDRESS ≤ CONDITION 2 VALUE. '6' indicates an evaluation of the contents of CONDITION 2 ADDRESS < CONDITION 2 VALUE.
55-56	1-4	Spares	
57-64	1-4	CONDITION 2 VALUE #1	The value to evaluate condition 2, for 64 bit type.
65-72	1-4	CONDITION 2 VALUE #2	The value to evaluate condition 2 for 32 bit type, or the continuation of a 64 bit type value.
73	1	RATE=1000	Changes record rate from 100 ms to 1000 ms

		MS	
73	2-4	Spare	
74-76	1-4	Spare	
77-84	1-4	ADDITIONAL 1	Address of Additional Parameter #1 to be recorded
85-92	1-4	ADDITIONAL 2	Address of Additional Parameter #2 to be recorded
93-100	1-4	ADDITIONAL 3	Address of Additional Parameter #3 to be recorded
101-108	1-4	ADDITIONAL 4	Address of Additional Parameter #4 to be recorded
109-116	1-4	ADDITIONAL 5	Address of Additional Parameter #5 to be recorded
117-120	1-4	Spare	

[00038] For example, referring to Table 1, if the character in the second position (character two) had a hexadecimal value such that its binary equivalent would have a "1" in the first position (left most position), then the system is set to record the data from ARINC input bus 1. If for character two the second bit number is also set to "1", the overall hexadecimal value would be a C (bit number of 1100 which is 12 in decimal and a C in hexadecimal) both the "FILTER RX 1" option and the "FILTER ASDB RX 1" option are set. This will enable recording of ARINC 429 input bus 1 with ASDB parameters. The ASDB parameters are preset parameters stored in the database that specify to record the data from the particular input or output and/or what data to record. Bus 1 can be defined to be any input into processor unit 208. The definition of which input is which component is stored in the ASDB, in one embodiment. The actual inputs and outputs to the processor unit 208 can be defined in the supplemental file. Referring to FIG. 4, the most significant bit was given the value of position one although one skilled in art would realize that the most significant bit or least significant bit could be called one and the system indexed from there. The same hold true for the positioning of the characters in the supplemental file 305, the most significant bit could be the nth bit or the first bit is the least significant bit or hexadecimal value.

[00039] An example of an exemplary supplemental file is:

[00040] "0C80 0000 0000 0000 1000 0000 1500 0000 0000 0000"

[00041] "2710 1000 0000 1300 0000 0000 0000 0000 0000 1000"

[00042] "0000 0000 0000 2000 0000 0000 0000 0000 0000 0000"

[00043] To translate this file the first hexadecimal character is 0 so that one has no effect on the recording. The second hexadecimal character is "C" which has a binary equivalent of 1100.

This turns on filter RX1 with filtering done according to the parameters stored in the ASDB. This turns on the recording of input bus 1 according to the ASDB parameters. The supplemental file above request ASDB specifies parameters from ARINC 429 input bus 1 and all parameters on ARINC 429 input bus 3 be recorded. Recording occurs when the radio altitude (the contents of address 1000 0000) is less than 10,000 feet and the aircraft on ground discrete (the contents of address 2000 0000) is false. The recording thus is stopped when the aircraft is on the ground or above an altitude of 10,000 feet. The following table, Table 2, decodes the above supplemental file using Table 1.

Table 2 Flight Recording Supplemental File Example

Character	Value	Name	T^2CAS Definition
1	0	Spare	N/A
2	C	FILTER RX 1 and 2	FILTER RX 1 On FILTER ASDB RX 1 On FILTER RX 2 Off FILTER ASDB RX 2 Don't Care.
3	8	FILTER RX 3 and 4	FILTER RX 3 On FILTER ASDB RX 3 Off FILTER RX 4 Off FILTER ASDB RX 4 Don't Care.
4	0	FILTER RX 5 and 6	FILTER RX 5 Off FILTER ASDB RX 5 Don't Care FILTER RX 6 Off FILTER ASDB RX 6 Don't Care
5	0	FILTER RX 7 and 8	Both FILTER RX's Off, FILTER ASDB RX settings are don't care
6	0	FILTER RX 9 and 10	Both FILTER RX's Off, FILTER ASDB RX settings are don't care
7	0	FILTER RX 11 and 12	Both FILTER RX's Off, FILTER ASDB RX settings are don't care
8	0	FILTER RX 13 and 14	Both FILTER RX's Off, FILTER ASDB RX settings are don't care
9	0	FILTER RX 15 and 16	Both FILTER RX's Off, FILTER ASDB RX settings are don't care
10	0	FILTER RX 17 and 18	Both FILTER RX's Off, FILTER ASDB RX settings are don't care
11	0	FILTER AI, FILTER GCAM, FILTER T^2CAS, Spare	Each of these FILTERs Off
12	0	FILTER TX 1 FILTER TX 2	Each of these FILTERs Off

		FILTER TX 3 FILTER TX 4	
13	0	FILTER D1 FILTER D0 Spare Spare	Each of these FILTERs Off
14-16	000	Spares	Don't Care
17-24	1000 0000	CONDITION 1 ADDRESS	Evaluate the data starting at address 1000 0000
25	1	CONDITION 1 TYPE	Condition Type = "1"; the translation of this is a 32-bit integer.
26	5	LOGICAL TEST 1	Test Type = "≤". This indicates an evaluation of the (contents of CONDITION 1 ADDRESS) ≤ (CONDITION 1 VALUE). A TRUE result, when ANDed with a TRUE result of Condition 2 results in recording of data.
27-28	00	Spares	Don't Care
29-36	0000 0000	CONDITION 1 VALUE #1	Don't care, because Start Condition Type is a 32-bit Integer.
37-44	0000 2710	CONDITION 1 VALUE #2	Integer value of 10,000. Indicates that the contents of address 1000 0000 will be evaluated for being less than or equal to 10,000.
45-52	2000 0000	CONDITION 2 ADDRESS	Evaluate the data starting at address 2000 0000. It is assumed that the Boolean value is stored in the LSB of this 32-bit word.
53	1	CONDITION 2 TYPE	Condition Type = "1"; the translation of this is a 32-bit Integer for this example of a Boolean evaluation. It is assumed that the raw boolean has been stored as the LSB of a 32-bit word at address 2000 0000.
54	3	LOGICAL TEST 2	Test Type = "=". This indicates an evaluation of the (contents of CONDITION 2 ADDRESS) = (CONDITION 2 VALUE). A TRUE result, when ANDed with a TRUE result of Condition 1 results in recording of data.
55-56	00	Spares	Don't Care
57-64	0000 0000	CONDITION 2 VALUE #1	Don't care, because Start Condition Type is a 32-bit Integer
65-72	0000 0000	CONDITION 2 VALUE #2	Represents a Boolean value of '0' or FALSE. Indicates that the contents of address 2000 0000 will be tested for being equal to FALSE or "0" in the LSB. Note: in general, the FALSE condition is the preferred Boolean to compare to. If the contents of CONDITION

			2 ADDRESS are equal to zero (resulting in a TRUE evaluation), and the results of LOGICAL TEST 1 are TRUE, data will be recorded.
73	0	RATE=1000 MS	Indicates false, which means that rate is 100 msec.
74-76	000	Spares	Don't Care
77-84	1000 0000	ADDITIONAL 1	Contents of Address 1000 0000 to be recorded (32 bits)
85-92	0000 0000	ADDITIONAL 2	No recording of additional address #2
93-100	2000 0000	ADDITIONAL 3	Contents of Address 2000 0000 to be recorded (32 bits)
101-108	0000 0000	ADDITIONAL 4	No recording of additional address #4
109-116	0000 0000	ADDITIONAL 5	No recording of additional address #5
117-120	1-4	Spare	

[00044] Referring to FIG. 5, the present invention provides a method for storing information to a memory card. A method for using the present invention is disclosed. In a first step 502, the supplemental file 305 is stored in the memory card 108. This can be done by a user with a computer and a reader/writer for the memory card 108. The user defines what parameters need to be recorded and what other options to activate recording. Based on those values and using the table similar to the one shown in conjunction with FIG. 4, the proper hexadecimal values are stored in the supplemental file 305. Also, the configuration file is stored, indicating if there is a supplemental file 305. After the supplemental file 305 is stored to memory card 108 in step 504, the memory card 108 is inserted into processing unit 102. In step 506, processing unit 102 reads the supplemental file 305 and determines what parameters are to be recorded based on the supplemental file and the table that defining the supplemental file. Then finally in step 508, data is saved to the data file portion 206 of the memory card 108 based on the instructions stored in the supplemental file 305.

[00045] One of the advantages of the present invention is that the supplemental file 305 can contain instructions to begin recording of data when certain parameters occur. For example, supplemental file 305 can contain instructions that, when read by processing unit 102, commences recording of data when the aircraft reaches a certain altitude and stops the recording after the aircraft has reached a second altitude. This can be useful in recording only the data needed to troubleshoot a suspected problem. In the present invention, the parameters indicating when to start and stop recording are entered into the supplemental file. For example, the start condition, i.e. what altitude to start recording at, can be entered into the supplemental file as well as the stop condition,

i.e. the altitude to stop recording at. Other parameters can also be used to control the recording of data including air speed and the like.

[00046] FIG. 6 illustrates the flow chart illustrating the recording of data based on preset recording conditions. In step 602, processor unit 102 checks to see if the parameter specified in the already read supplemental file 305 (such as altitude) has reached the value specified in the supplemental file 305. If not, no recording occurs and the parameter is checked again in step 602. If the value of the parameter has been reached, then recording to the storage file is activated in step 604. After an amount of data is recorded, i.e. at specified time intervals, the value of the parameter is checked again in step 606 to see if the values of the parameter are still within the values specified in the supplemental file 305 to permit recording. If the value of the parameter falls in to the range to stop recording, then the recording will stop in step 608. If not, recording continues. The present invention is useful to record different conditions at a set parameter value such as conditions occurring at a certain altitude range. Also, the same memory card 108 can be used over a period of time when only recording certain data that occur at certain parameters. Thus, the results of several flights at a certain altitude can be stored in one COMPACTFLASH or similar memory device for analysis.

[00047] Having now described preferred embodiments of the invention; modifications and variations to the present invention may be made by those skilled in the art. The invention is thus not limited to the preferred embodiments, but is instead set forth in the following clauses and legal equivalents thereof.